

## ABSTRACT OF THE INVENTION

A variable function voting solenoid-operated valve apparatus is provided having both high safety availability and high plant reliability that does not require a plant system to be bypassed during testing. Also provided is a variable function voting solenoid-operated valve apparatus wherein initiation of a safety action will occur only if each of a pair of operatively associated solenoid-operated valves in the apparatus are actuated, and wherein either of the solenoid valves can singly default to a pre-designated safety action without inadvertently actuating the process valve and isolating or venting the process fluid. Also provided is a variable function voting solenoid-operated valve apparatus wherein either a "1 out of 1 with hot stand-by" operational mode or a "2 out of 2 with high diagnostics" operational mode may be selected by an operator using a logic control system depending on the technical requirements of a given plant environment. Also provided is a variable function voting solenoid-operated valve apparatus, wherein a plurality of pressure sensing devices are incorporated to detect failure of either of a pair of operatively associated solenoid-operated valves so as to prevent inadvertent initiation of a safety action, and wherein a bypass switch is provided to allow on-line maintenance of the device should one of the solenoid valves fail during operation or when a failure is detected during a testing cycle. Finally, a variable function voting solenoid-operated valve apparatus is provided, wherein diagnostic information on the performance of the safety action, a partial movement of the process valve can be executed to prove the process valve is capable of actuating to the safe state, can be ascertained with either operational mode using a logic control system depending on the technical requirements of a given plant environment.